SPX Communication Technology division, SPX Corporation

Before The
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Preparation for Update to the	)	GN Docket No. 11-16
Rural Broadband Report	)	

Comments
on Behalf of
SPX Communication Technology division
SPX Corporation

EXHIBIT A

Rural Wireless Connectivity: Design Concepts for
Ubiquitous Coverage in Low Density Population Areas
From a Presentation at the IEEE Region 1 Northeast Industry Day 2010

Rural Wireless Connectivity: Design Concepts for Ubiquitous Coverage in Low Density Population Areas

From a Presentation at the IEEE Region 1 Northeast Industry Day 2010

Kerry W. Cozad, Dielectric Communications/SPX Corporation

Rural Coverage Challenges

- Technical Challenges
  - Limited coverage radius of a traditional cell-site leads to large number of cell sites
  - Thin population density, in true rural Greenfields, leads to severe underutilization of BTS resources
  - Limited resources of power supply to cover the large number of cell sites

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Rural Coverage Challenges

- Economic Challenges
  - Large CAPEX and OPEX commitment to cover a small population over a large area
  - Low income levels
  - ROI levels do not equate with the current business models

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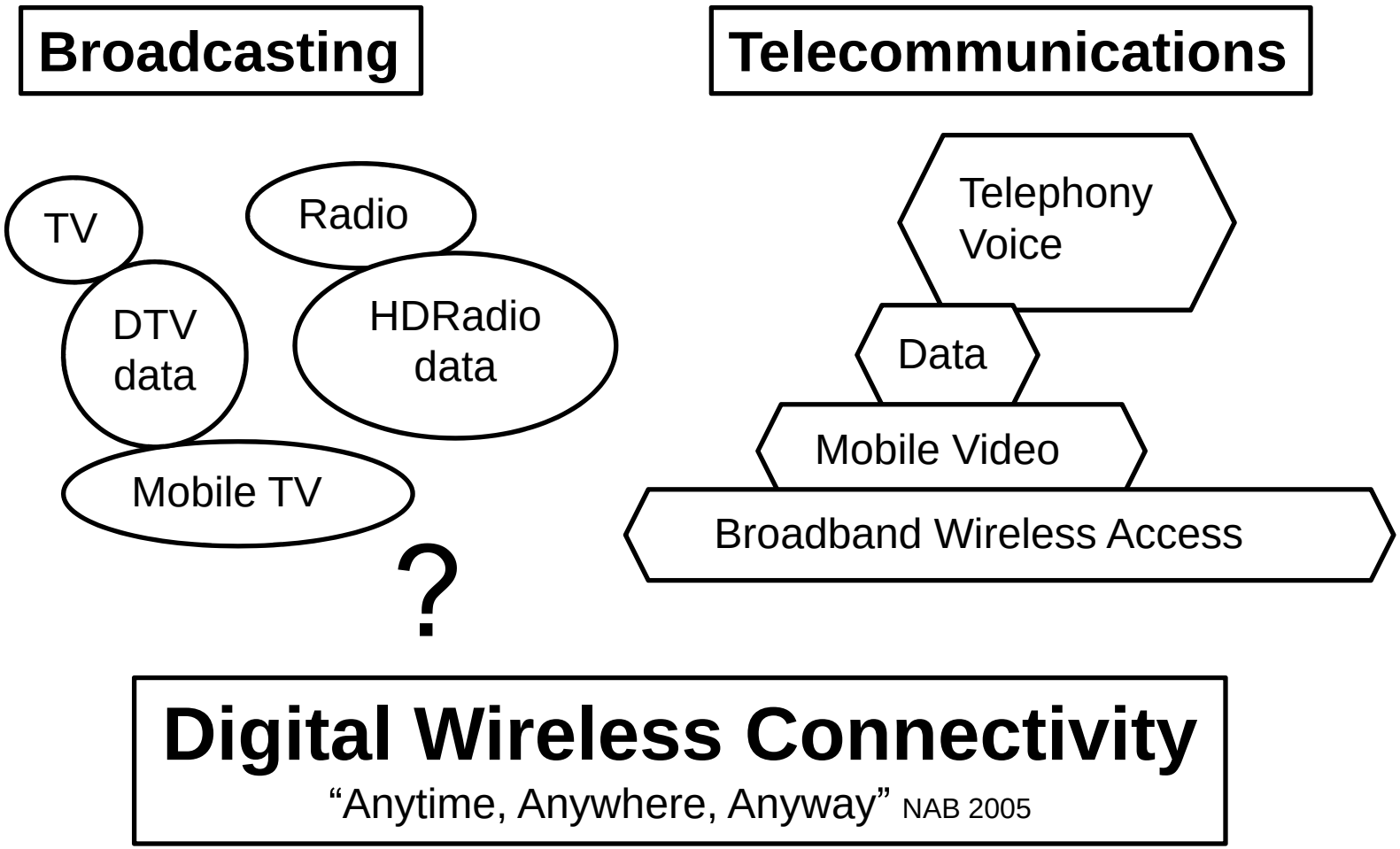
Convergence?



Digital Wireless Connectivity

"Anytime, Anywhere, Anyway" NAB 2005

Dielectric Communications

- **Broadcast Equipment**
  - DTV
  - FM
  - Mobile Media
  - Mobile Broadcast
- **Wireless Equipment**
  - Cellular
  - Broadband Wireless Access (BWA)
  - Public Safety
  - Wimax, LTE, 4G, etc.
- **Products**
  - Antennas
  - Filters, combiners, etc.
  - Transmission Line
  - PA's, LNA's, etc.

US Domestic & Global Deployments

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Cellular Broadcast System Concept

Traditional Antenna

- Coverage Efficient – 6X to 13X greater coverage; uniform power distribution over a wide coverage area.
- Power Efficient – low loss tower-top electronics; antenna radiates most of the power delivered to it
- Cost Efficient – 50% lower capex; 50-80% lower opex
- Scalable Capacity

vasTerra™ system

Cellular Broadcast System Concept

Force Coefficient Factor 43% Less

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vasTerra™ Wireless System

Broadcast Technology
Improved System Design
10x Coverage = Economical Deployment

Public Safety Interoperability (700 MHz)

Rural Mobile Telephony

Smart Grid Monitoring

Rural Wireless Broadband Access

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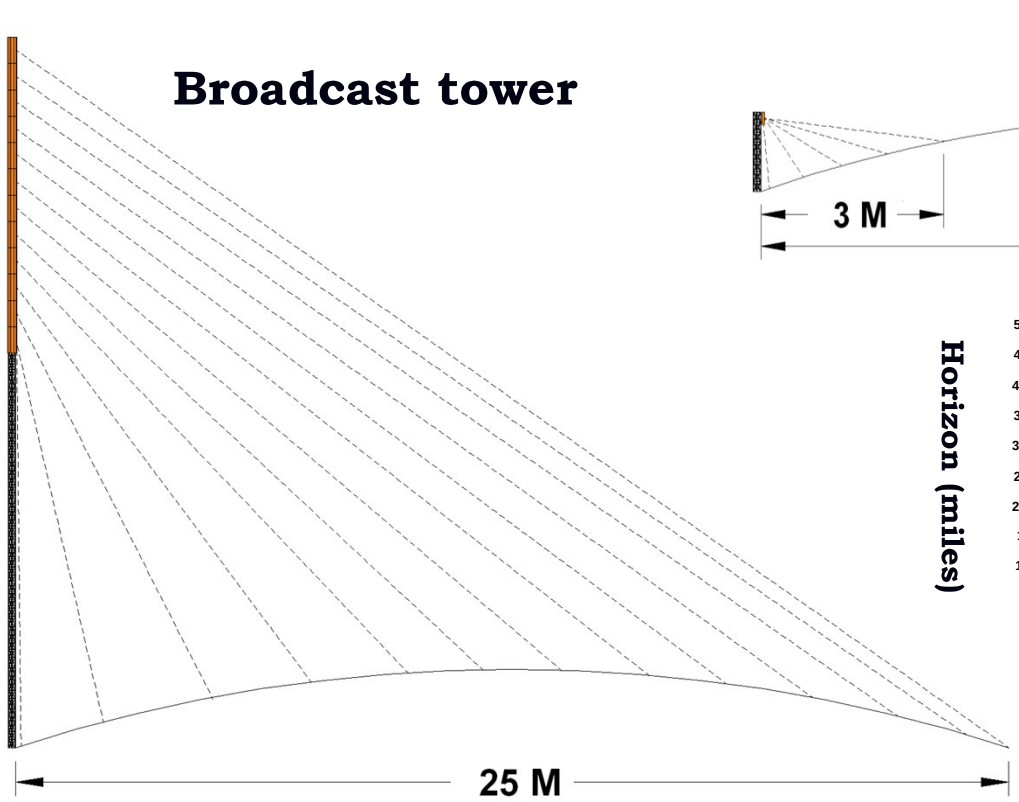
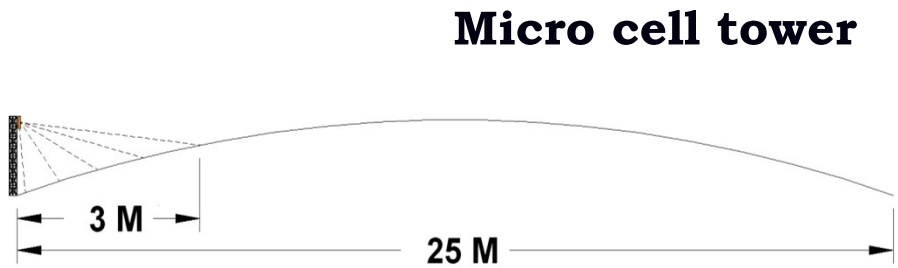
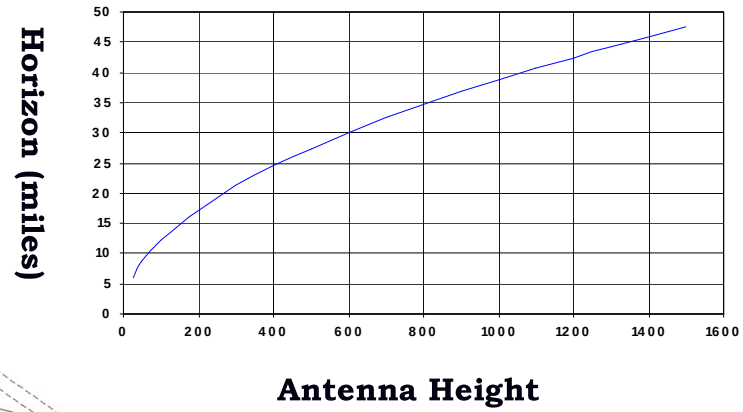
How can the coverage be increased 10-20 times?

Raise the antenna. **Similar to terrestrial broadcast, high-mounted antennas provide line of sight coverage to a large territory**



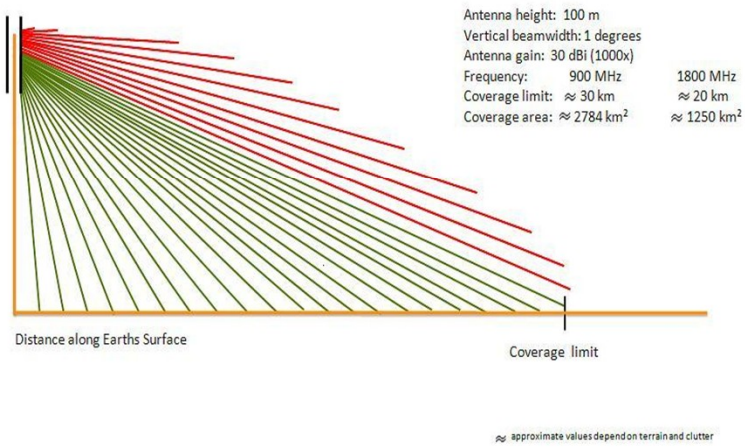




Coverage Benefits of New Antenna System

vasTerra™ Antenna System Site

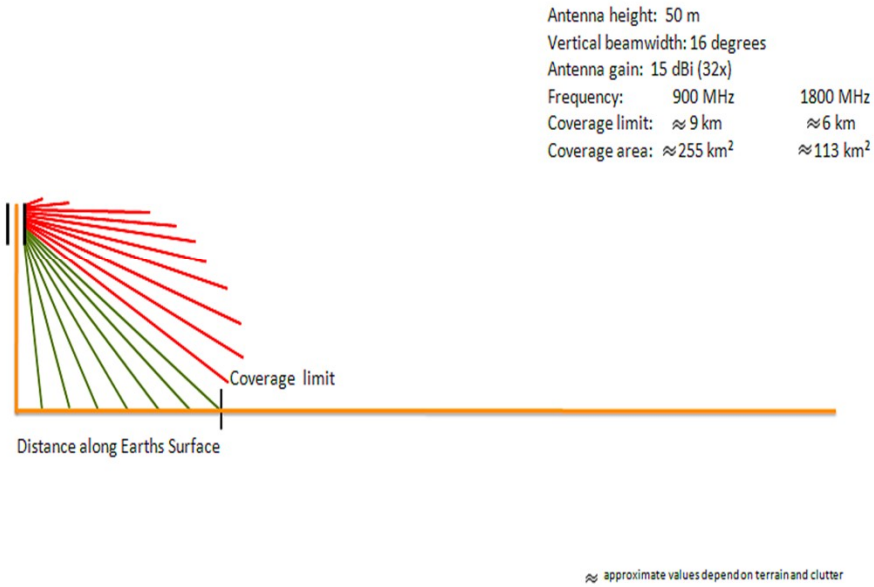
Figure 2: Coverage of vasTerra cell



Dielectric vasTerra Cell-site
Coverage is created by a phased-array antenna with a gain 30dB, vertical beam width ~1 deg, and height 100 m

Standard Traditional cell Site

Figure 1: Coverage of standard cell



Standard Cell-site
Coverage is created by an antenna with a gain 16-18dB, vertical beam width 6-8 deg, and height 50 m

- The vasTerra system can achieve 10X coverage, at an average, as compared to the traditional system

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“Robin Hood Principle”

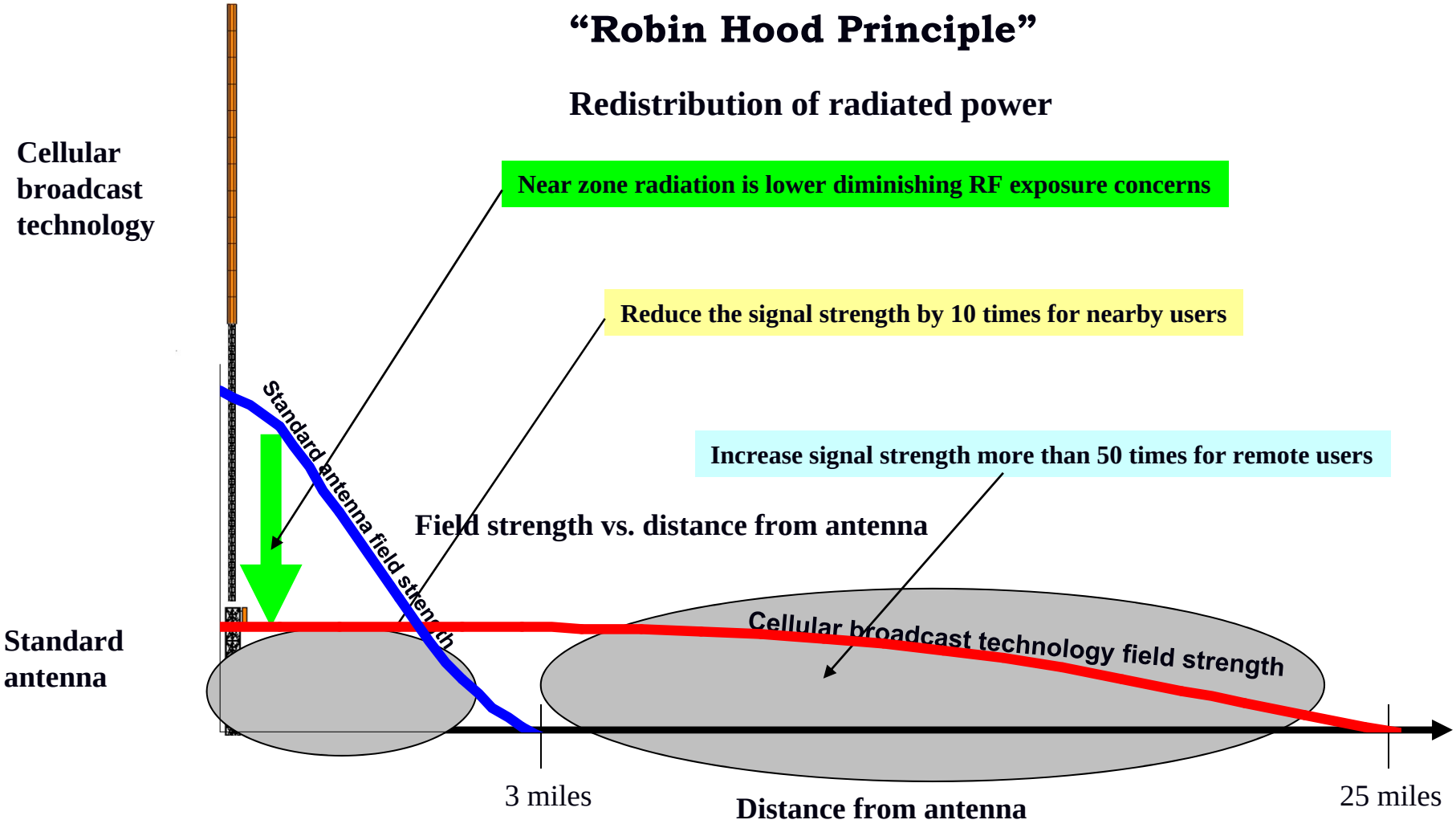
Redistribution of radiated power

Cellular broadcast technology

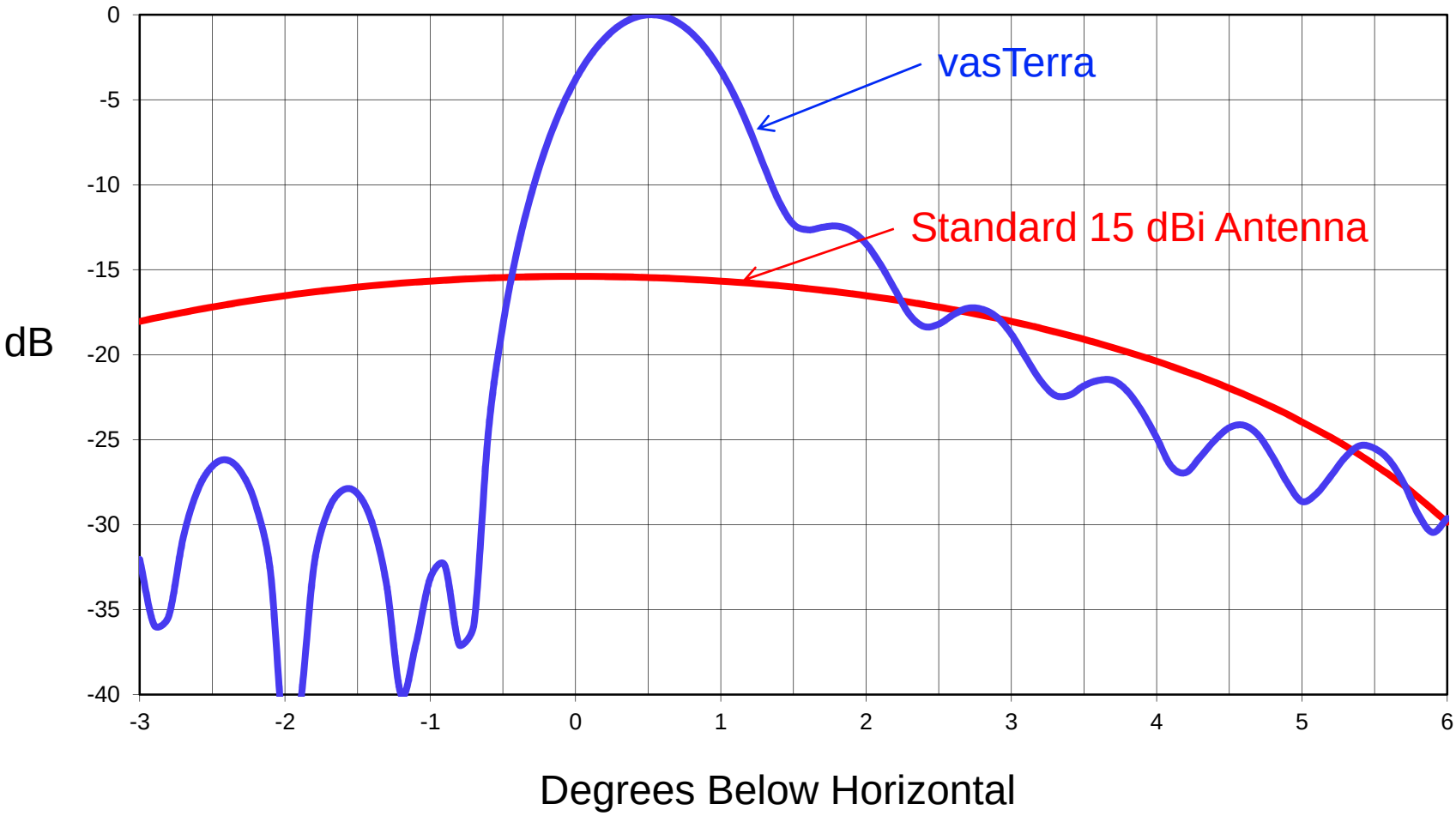
Near zone radiation is lower diminishing RF exposure concerns

Reduce the signal strength by 10 times for nearby users

Increase signal strength more than 50 times for remote users



Elevation Pattern – Standard 15 dBi Antenna vs. vasTerra™



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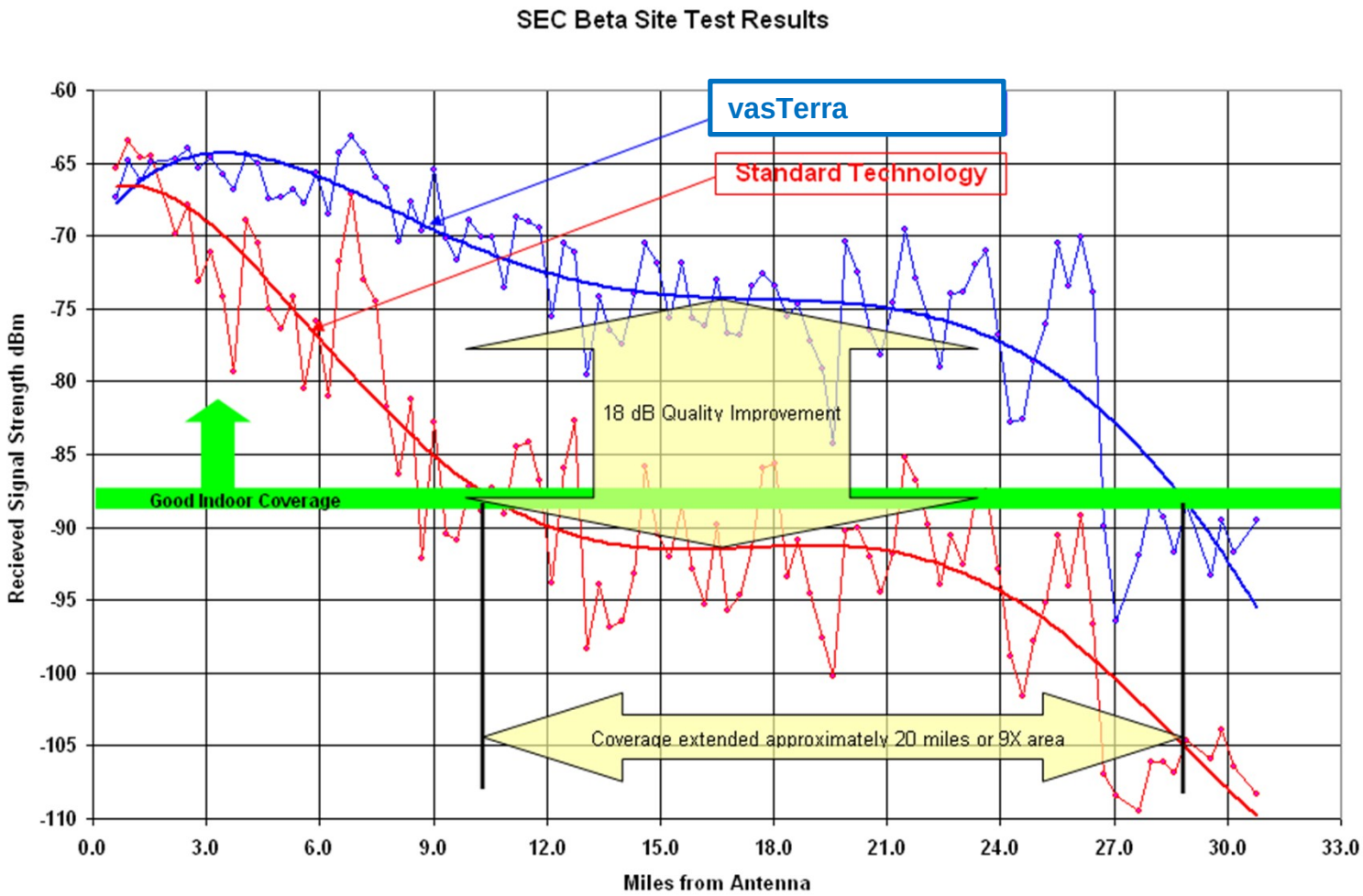
vasTerra™ Beta Site Test Results



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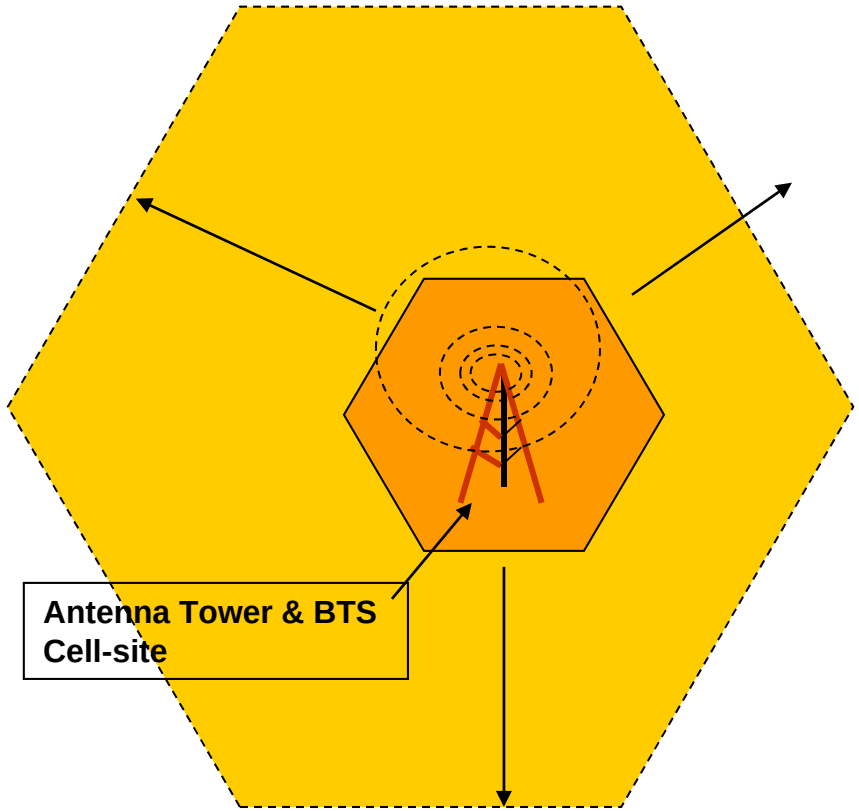
Coverage Benefit of vasTerra™ System

- The high mounted antenna provides a line-of-sight radio coverage over a 30-40km range
- High antenna gain, low cable losses, and low NF LNA amplify downlink and uplink signals.
- Link budget improved by 18 to 30dB in comparison to traditional cell-site and coverage by a factor of 6X-13X
- Intelligent beam forming techniques shape and focus the radiated energy so that it is uniformly distributed over the coverage region



Cell Coverage Increased by 6X–13X

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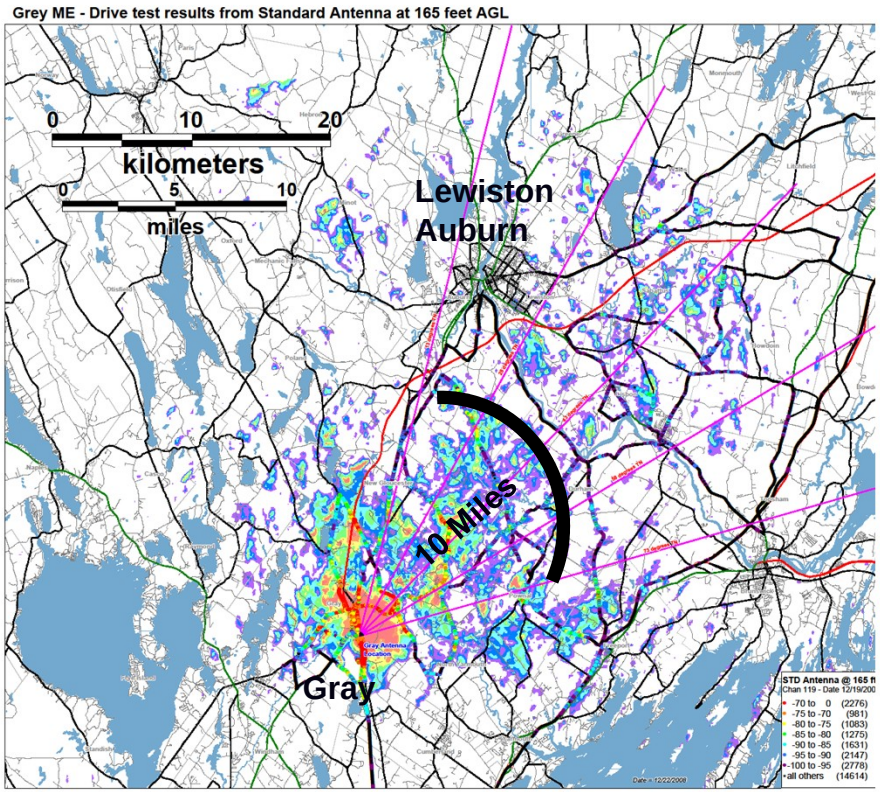
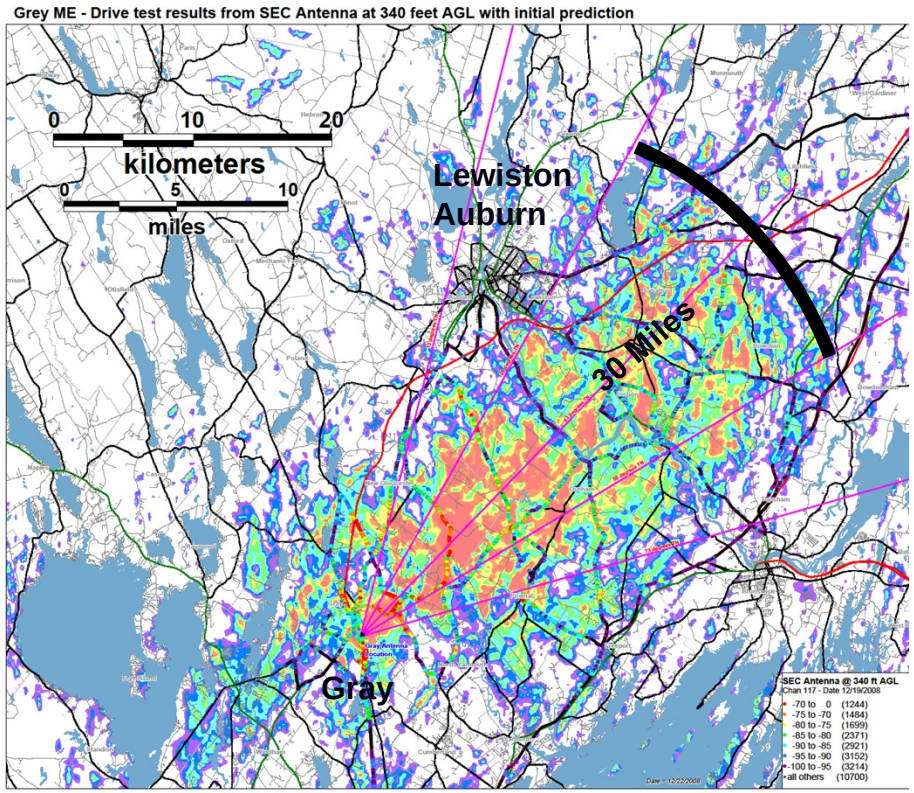
Beta Site – Gray Maine Drive Test Results

Single Sector Results (900 MHz)

Standard Antenna at 165



SEC Antenna at 345



SEC Provides 3 Times the Distance in Coverage of a Standard Antenna System

Measurements made under FCC Experimental STA
File Numbers 0051-EX-ML-2007 and 0024-EX-ST-2009

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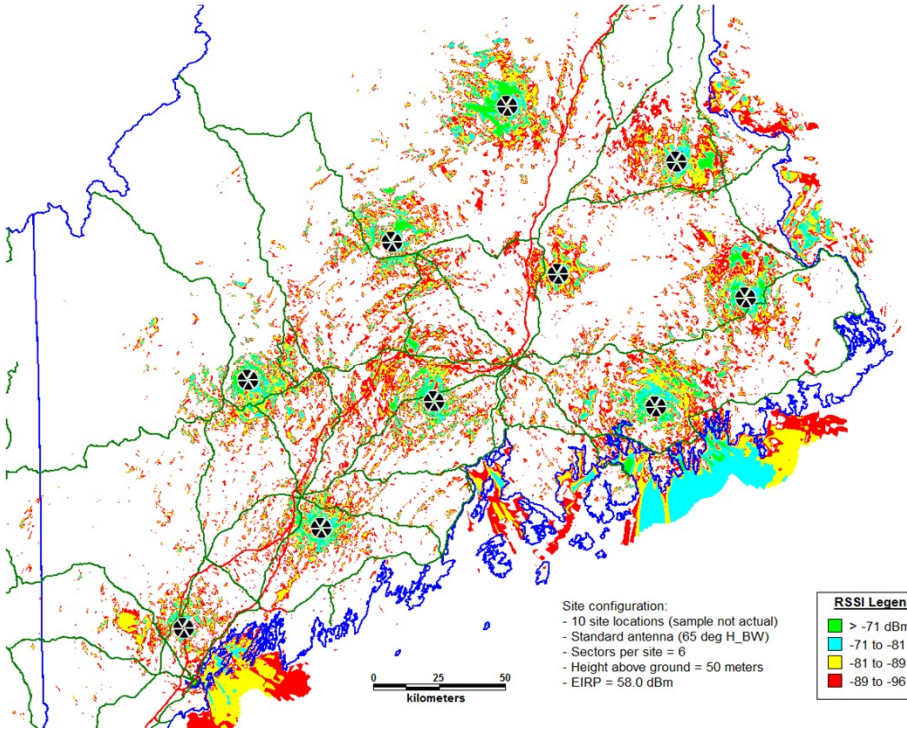
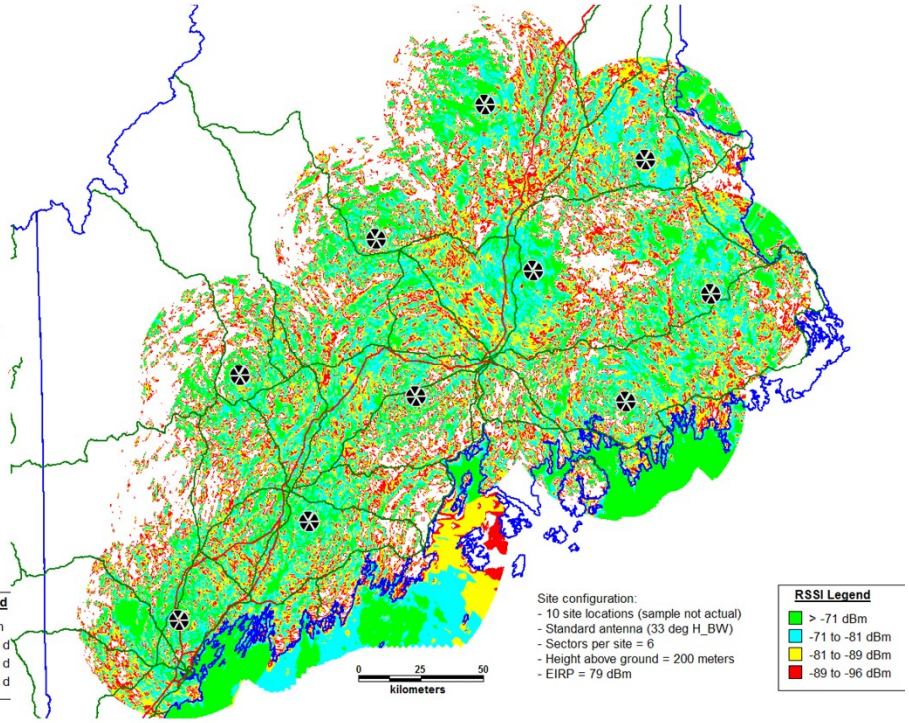
Cell Coverage Enhancement



10 Sites - Standard Macrocell Network



10 Sites - vasTerra ™ Network

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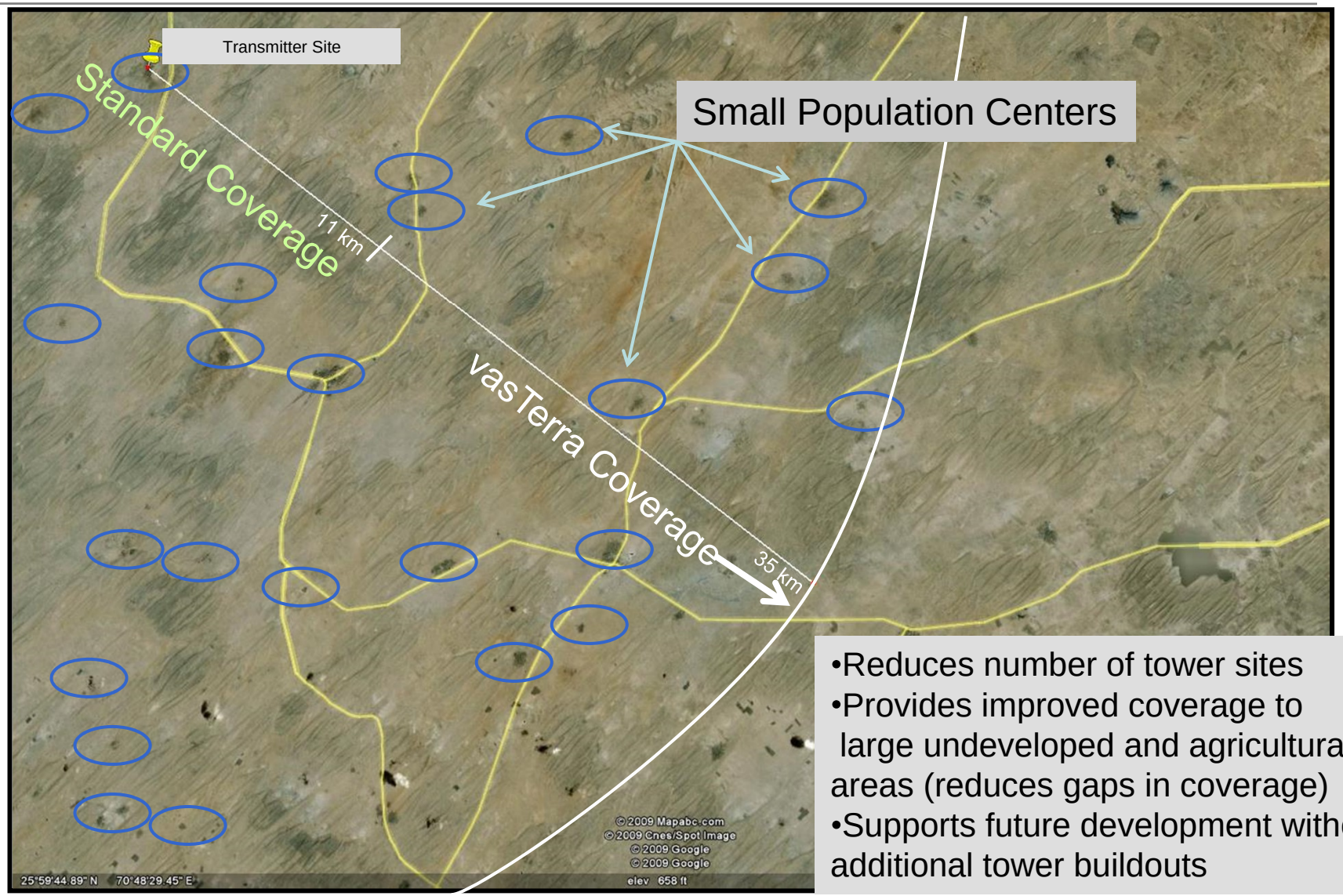
Benefit for Rural Coverage



- Reduces number of tower sites
- Provides improved coverage to large undeveloped and agricultural areas (reduces gaps in coverage)
- Supports future development without additional tower buildouts

Coverage of Many Villages in Rural Area

Village

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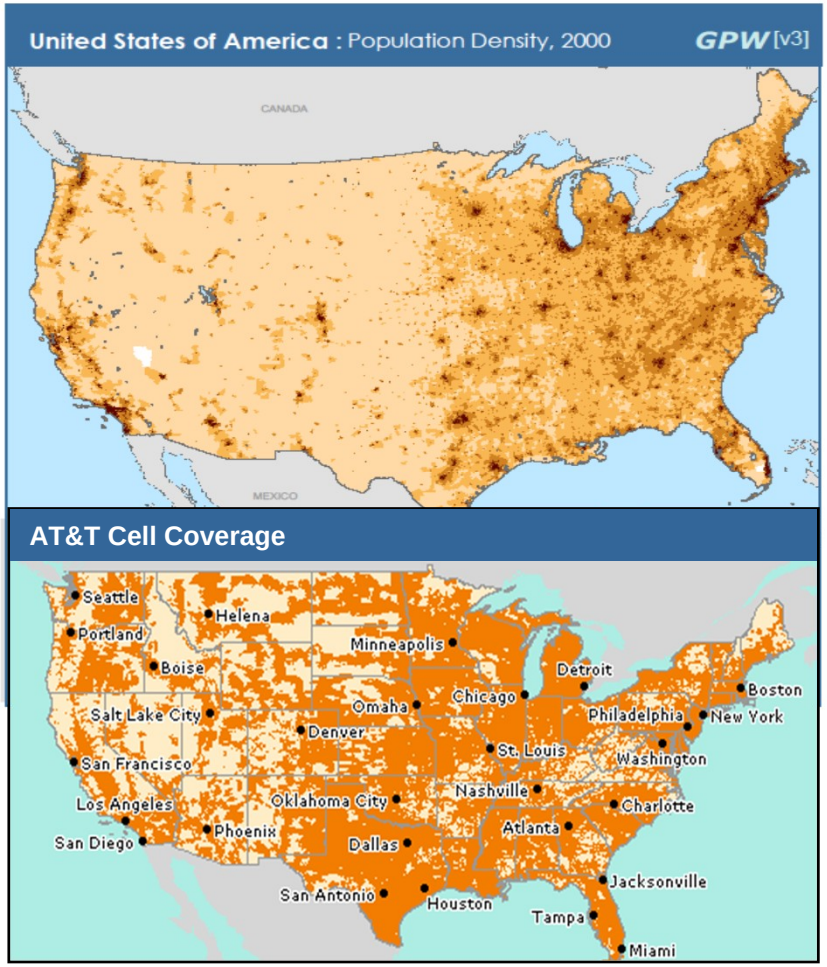
Rural U.S. Opportunities

- Cellular
  - Opportunities in Maine, the mid-west and other rural pockets of the country
- Wireless Broadband
  - Reduces number of sites
  - Speeds deployment
  - Reduces capital requirements
  - Reduces operational costs
  - Increase customer base
  - Improves performance



Economical Solution for Rural U.S. Coverage

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vasTerra™ Solution Saves Money

CAPEX Savings

- A nominal 10X expansion of the coverage area relative to a traditional cell-site translates into 10X reduction in the number of sites required
  - Significant less number of base stations
  - Reduction in cables and RF equipment requirement
  - Exponential reduction in construction and deployment costs
- Considerable simplification and cost reduction in the backhaul network

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vasTerra™ Solution Saves Money

OPEX Savings

- Reduction in network maintenance and repair costs by due to decreased number of required BTSs in the network
- Reduction in rental and lease expenses for land, towers, BTS premises and rented transmission lines
- Reduction in capital expenditure and extended useful life of equipment
- Energy utilization efficiency

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Key Performance Differentiators

- **Opens previously economically unviable territory for expansion**
- **Improves utility of the service by enabling continuous coverage (homes, fields and roads in between population centers)**
- **Faster deployments give competitive advantage in customer acquisition and revenue capture**
- **Increased tower capacity gives opportunity for increased revenues and improved profits**

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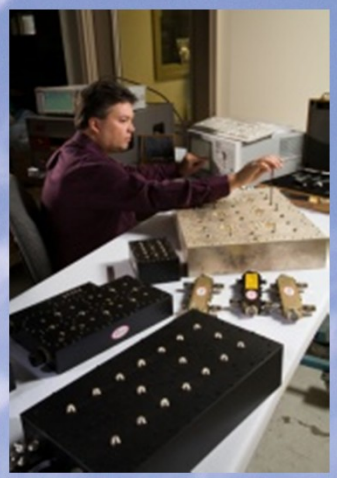
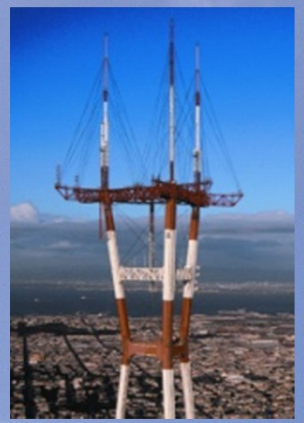
SPX Communication Technology
Dielectric Broadcast Systems
vasTerra Wireless Solutions





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